CLAIMS

1. A method of acquiring and processing images of a tooth, the method consisting in lighting a zone (12) of a tooth in monochromatic light and in picking up the luminance emitted by the lighted zone of the tooth, the method being characterized in that it also consists in:

· lighting said zone (12) of the tooth in monochromatic light at a wavelength selected to excite emission of fluorescence by the mineral portion of the tooth;

· using video means (32) to take images of the lighted zone of the tooth in two wavelength bands, one of which is in a high energy portion and the other of which is in a low energy portion of the emission spectrum;

· measuring the spectral intensity of the emitted fluorescence in these two wavelength bands at each point of said images; and

· taking the ratio at each point of the measurements in the two above-specified wavelength bands and comparing said ratio with predetermined values.

2. A method according to claim 1, characterized in that the lighting wavelength lies in the range about 300 nm to 370 nm.

3. A method according to claim 1 or claim 2, characterized in that the wavelengths of the above-specified bands lie in the range excitation wavelength to about 450 nm - 600 nm, and in the range about 550 nm - 600 nm and about 750 nm - 800 nm, respectively.

4. A method according to any preceding claim, characterized in that it consists in lighting said zone (12) of the tooth by alternating pulses at two different wavelengths, one in the ultraviolet and the other visible, in using the video means (32) to take fluorescence images in said high and low energy bands of

the zone lighted by pulses of ultraviolet wavelength, and images of said zone (12) lighted by pulses of visible wavelengths, and in transmitting these images to data processor and display means (40).

5. A method according to claim 4, characterized in that it consists in accumulating fluorescence images in the above-specified high and low energy bands and visible wavelength images prior to processing them and displaying an image of the fluorescence spectral intensity ratio and an image of said zone (12) of the tooth lighted in visible light.

6. A method according to any preceding claim, characterized in that it consists in using the same laser generator (16) to produce fluorescence exciting pulses (14) and lighting at a visible wavelength, said pulses being of a duration lying in the range a few microseconds to one nanosecond or less.

7. A method according to claim 6, characterized in that it consists in using the same laser generator (16) to produce synchronizing pulses, e.g. in the infrared.

8. Apparatus for performing the method described in any preceding claim, the apparatus comprising a source (16) of monochromatic light, optical means (22, 24, 26) for lighting a zone (12) of the tooth, and for picking up light coming from the tooth, means (30) for transmitting the picked-up light to spectral filter means (36), photoreceivers sensing the light leaving the spectral filter means (36), and data processor means (40) receiving the signals delivered by the photoreceivers, the apparatus being characterized in that the source (16) emits at a wavelength selected to excite emission of fluorescence by the mineral portion of the tooth, in that it comprises video means (32) for taking images of the

lighted zone (12) of the tooth, associated with shutter or time gate means (38) for taking alternately images of the zone (12) of the tooth as illuminated in visible light and fluorescence images of said zone (12) in high energy and low energy wavelength bands respectively of the emission spectrum, and in that the data processor means (40) are designed to take the ratio at each point of the image between the intensities measured in said wavelength bands of the emission spectrum.

9. Apparatus according to claim 8, characterized in that the spectral filter means (36) comprise interchangeable color filters or an acousto-optical filter or a liquid crystal filter or a set of dichroic mirrors.

10. Apparatus according to claim 8 or claim 9, characterized in that the transmission means (30) comprise an optical fiber image guide or a glass bar boroscope having a transverse refractive index gradient.

11. Apparatus according to any one of claims 8 to 10, characterized in that the lighting means comprise a laser generator (16) associated with spectral filter means (18) and controlled to produce pulses at different wavelengths for lighting the tooth in ultraviolet light and in visible light.

12. Apparatus according to claim 11, characterized in that the laser generator (16) is also controlled to produce synchronizing pulses, e.g. in the infrared.

13. Apparatus according to any one of claims 8 to 12, characterized in that it further comprises synchronizing means (42) connected to the light source (16), to the video means (32) for taking images, to the spectral filter means (18, 36), to the shutter or time gate means (36), and to the data processor means (40).